PATENT SPECIFICATION

604,083

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COMPLETE SPECIFICATION

Improved Method of and Apparatus for Handling Liquids

We, JOSAM MANUFACTURING CO., a Corporation of the State of Delaware, United States of America, of 1783, East 11th Street, Cleveland, Ohio, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a storm drainage system or other apparatus for handling liquids and having an oil and/or grease interceptor incorporated therein.

It is common practice in mill buildings and manufacturing plants to provide a storm drainage system which is separate from the sanitary sewage system. It has also been common practice to tie into the plant drain lines one or more oil or grease interceptors designed to reclaim or salvage oil or grease from waste oil drainage in the plant and thereby prevent grease pollution in the ultimate sewage disposal plant, or pollution of rivers or streams.

In apparatus for removing solids and recovering fats or oils from the waste water of sinks or from other waste liquids, it has been proposed to provide two vessels situated one above the other. The upper vessel is divided into a large and a small compartment by a plate which does not extend to the top of the vessel, and the larger compartment has a false bottom in the form of a screen. The water containing the grease is conducted on to said screen and passes through same and thence to the grease interceptor in the lower vessel. Any solid matter entering the apparatus with the water will be held by said screen. Any excess grease-containing water fed to said large compartment will flow over the upper edge of said plate into said small compartment whence it passes to an outflow for oil and grease freed water from the interceptor.

We propose to incorporate the separator in the storm system but in a new manner so that when the full storm drainage flow passes through the storm system the efficient operation of the interceptor will not be interfered with and the oil and grease which would otherwise be reclaimed or retained will not be flushed into the storm sewer.

To this end, the present invention has as its primary object the provision in the storm drainage system of apparatus which is designed to permit the utilization of the storm sewer for the conveyance of surface waters which include waste oil drainage to an oil and grease interceptor, while protecting the interceptor from flooding and from full storm drainage flow.

Another object of the invention is to provide a system or apparatus having a diverting chamber arranged to catch and direct normal waste oil flow, but to permit flash or full storm drainage to pass thereover and by-pass the interceptor.

Another object of the invention is to provide a system or apparatus having a by-pass sewer leading from a diverting manhole to a second or collecting manhole, the by-pass sewer being designed to pass heavy storm drainage directly, without passage thereof through the interceptor.

A further object of the invention is to provide a system or apparatus having a collecting manhole designed to permit direct storm drainage to a sanitary sewer and to collect the grease from the effluent passing through the interceptor.

A still further object of the invention is to provide a system or apparatus having a fore-bay or stilling chamber at the entrance to the interceptor, for slowing waste-oil flow and to permit settling of solids.

A still further object of the invention is to provide a system or apparatus having a tail-bay or sediment chamber at the outlet of the interceptor, for changing the direction of flow and for collecting solids separated by the interceptor.

With the foregoing objects in view, a

storm drainage system or other apparatus for handling oil and grease containing liquids and having an oil and/or grease interceptor therein is characterised, according to the present invention, in that it comprises a diverting compartment, a collecting compartment, between which compartments the oil and/or grease interceptor is located, a conduit connecting said diverting and collecting compartments, inlet means for liquid within the diverting compartment such that all of the normal flow of liquid entering said inlet means will pass to the interceptor but excess liquid due for example to flood or storm conditions will flow into the diverting compartment and thence through said conduit into the collecting compartment thus by-passing the interceptor.

A convenient constructional form of such an apparatus comprises an enclosed structure having an oil and grease intercepting compartment, a diverting compartment adjacent one end of said intercepting compartment, a collecting compartment adjacent the other end of said intercepting compartment, and an inclined by-pass conduit interconnecting said diverting and collecting compartments and spaced from said intercepting compartment, said diverting compartment having inlet means therein permitting overflow of excess liquid into said diverting compartment whence it flows to said by-pass conduit.

The invention also includes the method of handling an oil and grease containing liquid which comprises commingling said liquid with water resulting from storm conditions. Introducing said commingled liquid into one end of an oil and grease interceptor, and by-passing a portion of said commingled liquid to prevent flow thereof through the interceptor.

In the accompanying drawings, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same:—

Figure 1 is a plan view, illustrating in a more or less diagrammatic manner a preferred arrangement of the storm drainage apparatus or system in relation to various sewer conduits or mains.

Figure 2 is a vertical cross-sectional view, taken on the line 2—2 of Figures 1 and 3;

Fig. 3 is a cross-sectional view, taken on the line 3—3 of Fig. 2;

Fig. 4 is a cross-sectional view, taken on the line 4—4 of Fig. 3;

Fig. 5 is a view similar to Fig. 3, taken on the line 5—5 of Fig. 6, but showing a modified form of the apparatus;

Fig. 6 is a cross-sectional view, taken on the line 6—6 of Fig. 5;

Fig. 7 is a cross-sectional view, taken on the line 7—7 of Fig. 6;

Fig. 8 is a cross-sectional view, taken on the line 8—8 of Fig. 6;

Fig. 9 is a cross-sectional view, taken on the line 9—9 of Fig. 5;

Fig. 10 is a fragmentary detail view, showing baffle recesses and the method of securing a baffle therein;

Fig. 11 is a fragmentary cross-sectional view, taken on the line 11—11 of Fig. 10;

Fig. 12 is a view similar to Figs. 3 and and 5, taken on the line 12—12 of Fig. 13, but showing another modification of the invention;

Fig. 13 is a cross-sectional view, taken on the line 13—13 of Fig. 12.

Fig. 14 is a cross-sectional view, taken on the line 14—14 of Fig. 13;

Fig. 15 is a cross-sectional view, taken on the line 15—15 of Figs. 12 and 13;

Fig. 16 is a cross-sectional view, taken on the line 16—16 of Figs. 12 and 13;

Fig. 17 is a top view in elevation of a two-stage interceptor embodying the invention, the interceptor being shown connected in a sewer system:

Fig. 18 is a plan view partly in section of the interceptor shown in Fig. 17;

Fig. 19 is a view in section taken on line 19—19 of Fig. 18;

Fig. 20 is a view in section taken substantially on line 20—20 of Fig. 18;

Fig. 21 is a view taken on line 21—21 of Fig. 18;

Fig. 22 is an end view in elevation of a three-stage interceptor embodying the invention, which interceptor is shown connected in a sewer system;

Fig. 23 is a plan view partly in section of the interceptor shown in Fig. 22;

Fig. 24 is a view taken on line 24—24 of Fig. 23; and

Fig. 25 is a view taken on line 25—25 of Fig. 23.

Referring more particularly to Figs. 1 to 4 inclusive of the drawings, there is shown a storm drainage system or apparatus of generally U-shaped form in plan, comprising a main interceptor compartment or chamber 1, a diverting manhole 2, and a collecting manhole 3, the manholes 2 and 3 constituting the arms of the U-shaped interceptor, which may be constructed of any suitable masonry, steel, iron or wood material, such as concrete.

The compartment 1 is partitioned from the manhole 2 by means of a vertically extending wall or partition 4, having a square opening 5 therein at a point intermediate the top and bottom thereof, whereby access from the compartment 1 to the manhole 2 may be had, or *vice versa*. The top surface of the structure may be at

or below ground level to permit trucking thereover, or it may extend above the ground as desired.

The compartment 1 is in open communication throughout its height with the collecting manhole 3, but under some conditions, depending upon the sewer levels and extent of pollution of the water which is to be handled by the interceptor, the compartment 1 may be partitioned from the manhole 3 by a dam or wall (not shown).

Access to the manhole 2 for grease removal and other purposes may be had by removing a cover 6, and to the manhole 3 by removing a cover 7, suitable ladders 8 and 9 being provided in the respective manholes for descent into the latter. A removable cover 10 is also provided for one end of the interceptor compartment, and a cover 11 is also provided for access to such compartment at opposite sides of a wall or baffle 12, which extends into said compartment at a point adjacent the discharge end of the latter. Ladders 13 and 14 are also provided for descent into the compartment 1 at opposite sides of the wall 12.

A storm and waste oil sewer inlet pipe 15 extends through the end wall 16 of the interceptor structure into the manhole 2, is turned 90 degrees and then extends through the wall 4. The portion of this pipe which extends through the manhole 2 is set in the concrete bottom or floor 17 of the manhole, and has the upper half thereof in the manhole 2 removed for a purpose to be presently described.

The manhole 3 has a bottom or floor 18 which is at a substantially lower level than the floor 17 of the manhole 2, and a by-pass sewer or conduit 19 is provided by which a gravity flow or communication is established at times between the floors 17 and 18 of the respective manholes, it being noted in Fig. 2 that the floor 17 is sloped downwardly from the upper edge of the portion of the inlet pipe 15 which extends through the manhole 2, so as to facilitate flow to the sewer 19. An outlet sewer 20 is also provided, which extends from the manhole 3 through the end wall 21 of the interceptor, this sewer communicating, as shown in Fig. 1 with a sanitary sewer 22. An auxiliary storm sewer 23 (Figs. 1 and 3) may also be provided, which communicates with the sewer 19.

The bottom of floor 24 of the inlet end of the interceptor compartment has positioned thereon a sediment bucket 25, and the portion of the interceptor compartment in which this bucket is disposed constitutes a fore-bay or stilling chamber for slowing the waste oil flow and permitting settling of solids.

The interceptor proper is preferably of the known type comprising a cascade bottom 26 (which is centrally channeled as at 27), the end walls 28 and 29, the depending wall 12, and a series of baffles 30, 31, 32, 33 and 34. The cascade bottom and the baffles as well as the function thereof are well known. In general, the interceptor under normal conditions functions to separate the oil and grease from waste water which flows through the interceptor, the oil and grease which is thus reclaimed being drawn off through an outlet 35 and into a storage tank 36 (Fig. 3), and the clarified water being discharged over the end wall 29 and into the collecting manhole 3.

The portion of the interceptor compartment just beyond the wall 29 constitutes a tail-bay or sediment chamber which changes the direction of flow, diverting the flow to the collecting manhole. This tail-bay or sediment chamber also serves to collect solids separated by the interceptor.

Having thus described the general construction of the interceptor, the operation and use thereof will now be briefly described.

The inlet pipe 15 is of such a size as to normally carry not only all of the waste water flow discharged into the storm sewer lines of a large plant or factory, but to handle all of the flow resulting from storm conditions. The conduit, in other words, serves as a combined storm and waste oil sewer and the various surface drains and drain sumps, including the floor drains, are connected into the storm sewer system.

At times when storm conditions do not prevail, the normal flow through the conduit 15 will be such as to be confined entirely to the culvert-like portion of the conduit which extends through the manhole 2, with the result that all of such flow will pass through the interceptor compartment 1, the clarified water being then discharged into the collecting manhole 3, thence through the sewer 20 and into the conventional sanitary sewer 22.

In the event of a flash flood or an unusual storm condition, however, the normal flow through the conduit 15 will be augmented by the water resulting from such flood, and the excess water, in such case, will overflow the upper edges of the culvert-like portion of the conduit which extends through the manhole 2, and will flow down the sloping floor 17 of the manhole and into the by-pass sewer 19, thence into the collecting manhole 3, into the sewer 20 and sanitary sewer 22, it being noted that the sewer 20 is of considerably larger diameter than the sewer 15, so as to enable it to handle flow from the intercep-

tor compartment as well as the flow from the by-pass sewer.

Although the overflow which is handled by the by-pass sewer 19 is not subjected to clarification in the interceptor compartment 1, such overflow will usually contain so little oil or grease as to not require clarification, but in any event the amount of oil or grease therein is such as not to be objectionable from the standpoint of discharge into the sanitary sewer. Should the flood condition be of such extraordinary proportions as to cause part of the separated oil or grease to be forced into the outlet, the condition will be only temporary and the amount of escaped oil or grease will be small in comparison to the large volume of storm water being discharged into the river or stream.

Where the plant is of unusual size, an auxiliary storm sewer 23 may be provided, which will by-pass a considerable part of the storm flow directly to the sewer 19, as indicated in Fig. 8.

Referring now to that form of the apparatus shown in Figs. 5 to 9 inclusive, the apparatus in this case is also of generally U-shaped form in plan, comprising a main interceptor compartment 40, a diverting manhole 41 and a collecting manhole 42, the manholes 41 and 42 constituting the arms of the U-shaped interceptor.

The compartment 40 is partitioned from the manhole 41 by a vertically extending wall or partition 43 having a rectangular opening 44 therein providing a flow opening or communication between the manhole 41 and the compartment 40.

The compartment 40 is similarly partitioned from the manhole 42 by a vertically extending wall or partition 45 having a rectangular opening 46 therein providing a flow opening or communication between the compartment 40 and the manhole 42.

It will be noted, from Figs. 8 and 9, that the manholes 41 and 42 do not extend the full height of the compartment 40, but are so constructed that the bottoms or floors thereof are substantially at the levels of the bottoms of the openings 44 and 46, thereby resulting in a considerable saving of concrete over the previously described form of interceptor.

Moreover, instead of utilizing metallic conduit sections for the storm and waste sewer inlet, as in Fig. 3, the end wall 47 of the interceptor is provided with an extension 48, which may be formed by inserting a concrete conduit in the wall as the concrete wall is cast, and the manhole 41 is provided with a molded bottom 49, the upper surface of which is molded to provide an open, curved channel 50, interconnecting the inlet sewer 48 and the opening 44 in the partition 43 for passing normal waste oil or grease drainage and to provide an overflow dam from the channel 50 to by-pass sewer 53 for heavy storm drainage.

The manhole 42 is similarly provided with a molded bottom 51, the upper surface of which is molded to provide a culvert-like drain 52, adapted to receive fluid flow from the compartment 40 through the opening 46, as well as flow from a by-pass sewer 53, which interconnects the manholes 41 and 42 and is preferably molded as an integral part of the interceptor, as indicated in Fig. 5, the inflow end of the sewer 53 being at a somewhat higher level than the outflow end thereof, as indicated in Fig. 8.

To facilitate the flow of heavy storm drainage, the drain 52 is pitched in accordance with the pitch of the by-pass sewer, whereby, with the dam formed by partition 45, back-flow to the tail bay is prevented.

The interceptor proper, in this instance, is also of the type comprising a cascade bottom 56, which is centrally channeled as at 57, end walls 58 and 59, a trap baffle 60, and a series of baffles 61, 62, 63, 64 and 64¹. Here again the interceptor functions to separate the oil and grease from water which flows through the interceptor, the oil and grease which is thus reclaimed being drawn off through an outlet 65 and into a storage tank 66 (Fig. 5), and the clarified water being discharged over the end wall 59 and partition 45 and into the collecting manhole 42.

The operation and use of the interceptor in Figs. 5 to 9 inclusive need not be described, since such operation and use will be fairly obvious from the description of the operation and use of the interceptor shown in Figs. 1 to 4 inclusive.

In the interceptors of Figs 5 to 9 inclusive, the baffles 61, 62, 63, 64 and 64¹ may be constructed of steel or formed of wood or wooden planks, in which case the baffles will, as shown in Figs. 10 and 11, be disposed with their lateral edges extending into recesses 67 and 68 in the opened side walls of the interceptor compartment 40, the baffles being thus retained in position by means of vertically spaced wedges 69. This construction facilitates removal of the baffles for repair or replacement purposes.

Referring now to that form of apparatus shown in Figs. 12 to 16 inclusive, the apparatus in this case is of generally rectangular form in plan, the interceptor compartment 70 extending entirely across the apparatus.

The diverting manhole 71, by-pass sewer 72 and collecting manhole 73 are

formed as integral parts of the apparatus, being partitioned from the interceptor portion thereof by a vertical wall 74 and horizontal wall 75.

A storm and waste oil sewer inlet pipe 76 extends through the end wall 77 of the apparatus into the manhole 71 and through the wall 74, the portion of this pipe which extends through the manhole and wall 74 being set in the concrete bottom or floor 75 of the manhole and having the upper half thereof removed to permit overflow resulting from storm conditions to flow directly into the sewer 72. Such overflow then passes into the collecting manhole 73, where it is commingled with the clarified liquid from the interceptor, passing into the outlet sewer 77, which communicates with the storm or sanitary sewer.

The interceptor proper is also of the type comprising a cascade bottom 78, centrally channeled as at 79, end walls 80 and 81, a trap baffle 82, and a series of baffles 83, 84, 85, 86 and 87.

The oil and grease which is reclaimed is drawn off through an outlet 88 and into a storage tank 89.

Where it is desirable to remove substantially all of the oil and/or grease from the waste effluent it may be desirable to use a multi-stage interceptor which provides more efficient separation of oil and grease from the effluent than is possible from the single stage interceptor. For example, the pollution of the final effluent from the multi-stage interceptor may be as little as 1/10 of 1% or less of the effluent volume.

Referring to Figs. 17, 18 and 19, there is shown a two-stage interceptor 100 connected in a storm sewer system. The interceptor 100 includes two rectangular main interceptor compartments 101 and 102, a diverting manhole 103 and a collecting manhole 104. The compartments 101 and 102 are arranged side by side and are connected in series so that the discharge effluent from compartment 101 flows into compartment 102. The interceptor compartments are formed by end walls 105 and 106, side walls 107, 108 and 109 and top wall 110. The compartments 101 and 102 are constructed similarly to the single stage interceptors described hereinbefore and compartment 101 is provided with a channeled cascade bottom 111 which slopes toward the right-hand end as viewed in Fig. 19. In the compartment 101 a fore-bay 111a is formed at the left-hand end by a transversely extending wall 112, and a plurality of transversely extending baffles 113, 114, 115, 116 and 117 are provided, which are similar to the baffles described with reference to the single stage interceptors. A tail-bay 120 is formed by a wall 121 extending upwardly from the bottom of the compartment 101, and a depending wall 122, extending from the top of the compartment, forms a trap 123 intermediate the walls 121 and 122.

An opening 125 is formed in the wall 108, the bottom of which opening is on the same level as the tops of walls 112 and 121 for forming an outlet from chamber 101 for directing the effluent into the interceptor compartment 102. The interceptor chamber 102 is similar to the interceptor chamber 101 except that the bottom slopes in the opposite direction so that flow of effluent is reversed, and similar elements are indicated by corresponding reference numerals, but with the addition of a prime thereto.

Preferably, the oil and grease is drawn off of the waste water in the interceptor compartment through outlets 126 and directed to a storage tank 127 by pipes 128.

The diverting manhole 103 is located at one end of the interceptor compartment 101 and is formed by side walls 105, 127, 128 and 129, top wall 130 and a bottom or floor 131. Wall 129 is provided with a circular opening therein for receiving a sewer drain pipe 132. The bottom 131 has an open top channel 134 formed therein, one end of which channel is in alignment with the discharge end of sewer pipe 132 and the opposite end of the channel is in alignment with an inlet opening 135 in the wall 105 of the interceptor compartment 101. The bottom 131 is formed to slope downwardly from the open top of channel 134 to an opening 136 in the side wall 127 so that in the event of an abnormal flow of effluent into the manhole the excess effluent will overflow the channel and will be diverted through the opening 136 and by-pass the interceptor 100 in a manner to be described more fully hereinafter.

The second stage of the interceptor 100, i.e., the interceptor chamber 102, discharges clarified effluent through an opening 137 into the collecting manhole 104 which is formed by side walls 139, 140 and 141 and a top wall.

Referring to Fig. 18 it will be seen that the diverting manhole 103 is connected with the collecting manhole 104 by a pipe 145 which is connected with the opening 136 in the manhole 103 and leads to an opening 146 in the wall 139 of the manhole 104. The manhole 103 is on a higher elevation than manhole 104 so that the effluent will flow by gravity from manhole 103 to manhole 104. A discharge sewer pipe 148 is connected with the manhole 104 for carrying off the effluent which is discharged into the manhole through

opening 137 and pipe 145.

It will be apparent that when the quantity of effluent discharged from sewer pipe 132 is greater than that which can be handled by the interceptor 100, the excess effluent will overflow the channel and by-passes around the interceptor through the pipe 145, manhole 104 and into the sewer system through pipe 148.

Access may be had to the compartments and manholes through hatches 150 and ladders 151 are provided at each hatch for descent into these chambers for cleaning sediment and other debris therefrom.

In Figs. 22 and 23 we have shown a three-stage interceptor, which causes effluent to pass through three-interceptor compartments connected in series so that the waste effluent passes through successive interceptor compartments before finally being discharged into the sewage system. The interceptor 200 comprises three interceptor compartments 201, 202 and 203 which are substantially similar to the compartments 101 and 102 described hereinbefore. The outlet of compartment 201 discharges into the inlet of compartment 202 through opening 220 and the outlet of compartment 202 discharges into the inlet of compartments 203 through opening 220*a*. The lower edges of openings 220 and 220*a* are level with the tops of walls 121*a* and 121*b*. The elements of the compartments 201, 202 and 203 which correspond to the elements shown in compartment 101 are referred to by corresponding numerals but having suffixes *a*, *b* and *c* respectively.

A diverting manhole 204 is located adjacent the inlet end of compartment 201 and a sewer pipe 205 discharges into this manhole. The bottom of the manhole is provided with an open top channel 207 which directs effluent from the discharge pipe 205 to the inlet 208 of the interceptor 201. The bottom surface of the manhole slopes from the open top of the channel 207 to an outlet 209 in the side of the manhole for directing any overflow from the channel to the outlet.

Preferably, a collecting manhole 215 is provided at the same end of the interceptor 200 as is manhole 204, but on the opposite side of the interceptor and having its bottom surface at a lower level than the bottom of manhole 204 and a by-pass conduit 216, sloping downwardly from manhole 204, is provided for conducting the effluent overflow from the channel 207 to the collecting manhole.

The effluent discharge of the interceptor compartment 203, which is the last of the interceptor units of the series of interceptors, is located at the end of the interceptor opposite the collecting manhole 215. The discharge from interceptor compartment 203 empties through outlet 218 into a basin 219 and a conduit 220 connects the basin with the manhole 215. The bottom of the basin 219, which is formed by a concrete slab 230, is on a higher level than that of the manhole 215 and conduit 220 slopes downwardly to the manhole.

The collecting manhole is connected in the sewage system by a conduit 221 for carrying away the waste effluent.

As in the interceptor described hereinbefore, the interceptors 201, 202 and 203 are provided with drains 225 for drawing off oil and grease on the surface of the waste water in the interceptor compartments and such oil and grease are carried through pipes 226 to a storage tank 227.

Also closable hatches 228 are provided whereby the manholes and interceptor chambers may be entered for cleaning and inspection, and ladders 229 are provided for descent therein.

It is apparent that any desirable number of interceptor stages may be provided, depending upon the degree of efficiency required, which stages may be connected in the sewer system so that in the event of abnormal flow of effluent to the interceptors the excess of the capacity of the interceptors will be diverted or by-passed to the sewage system.

It is to be understood that the form of the invention, herewith shown and described, is to be taken as a preferred example of the same, and that the various changes in the shape, size and arrangement of parts may be resorted to, without departing from the invention, or the scope of the subjoined claims.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A storm drainage system or other apparatus for handling oil and grease containing liquids and having an oil and/or grease interceptor incorporated therein, characterised in that it comprises a diverting compartment, a collecting compartment, between which compartments the oil and/or grease interceptor is located, a conduit connecting said diverting and collecting compartments, inlet means for liquid within the diverting compartments such that all of the normal flow of liquid entering said inlet means will pass to the interceptor but excess liquid, due for example to flood or storm conditions, will flow into the diverting compartment and thence through said conduit into the collecting compartment thus by-passing the interceptor.

2. Apparatus as claimed in Claim 1,

wherein the diverting compartment is connected with a storm sewer.

3. Apparatus as claimed in Claim 2, having an auxiliary storm flow conduit discharging into said conduit at a point intermediate the diverting and collecting compartments.

4. A storm drainage or other apparatus for handling oil and grease containing liquids, which apparatus comprises an enclosed structure having an oil and grease intercepting compartment, a diverting compartment adjacent one end of said intercepting compartment, a collecting compartment adjacent the other end of said intercepting compartment, and an inclined by-pass conduit inter-connecting said diverting and collecting compartments and spaced from said intercepting compartment, said diverting compartment having inlet means therein permitting overflow of excess liquid into said diverting compartment, whence it flows to said by-pass conduit.

5. An apparatus as claimed in Claim 4 in which the diverting compartment has an open-top inlet conduit means therein for conducting liquid through said diverting compartment to the intercepting compartment, said conduit permitting an overflow of said liquid over the upper edges thereof and directly to said by-pass conduit.

6. Apparatus as claimed in any of the preceding claims, in which the oil and grease interceptor comprises two or more interceptor compartments connected in series.

7. The method of handling an oil and grease containing liquid which comprises commingling said liquid with water resulting from storm conditions, introducing said commingled liquid into one end of an oil and grease interceptor, and by-passing a portion of said commingled liquid to prevent flow thereof through the interceptor.

8. The method as claimed in Claim 7, in which the by-passed liquid is reunited with the clarified liquid.

9. The method of preventing oils and greases mingled with surface drained effluents from an industrial plant from reaching the ultimate sewerage discharge line of the plant, which method comprises arranging the discharge connections, of the floor drains of the plant to discharge into a storm sewer line of the plant which is separate from the sanitary sewerage system of the plant, directing all of the normal flow of surface drainage thus flowing in the storm sewer line into a continuous flow type oil and grease interceptor, and passing the clarified surface drainage to the ultimate sewer discharge line while permitting the storm sewer line to discharge directly into the ultimate sewer discharge line by an overflow by-passing of the separator under extraordinary flood conditions during severe storms.

10. Apparatus for handling liquids substantially as hereinbefore described with reference to Figures 1—4, 5—11, 12—16, 17—21, or 22—25 of the accompanying drawings.

Dated this 23rd day of November, 1945.
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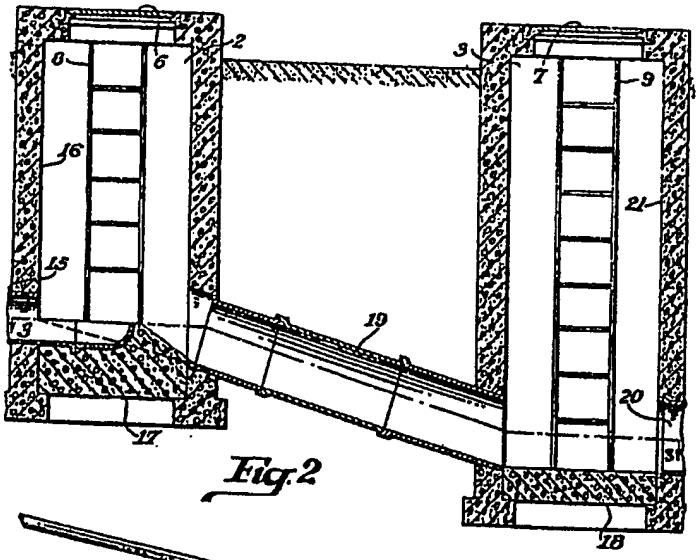

Fig. 2

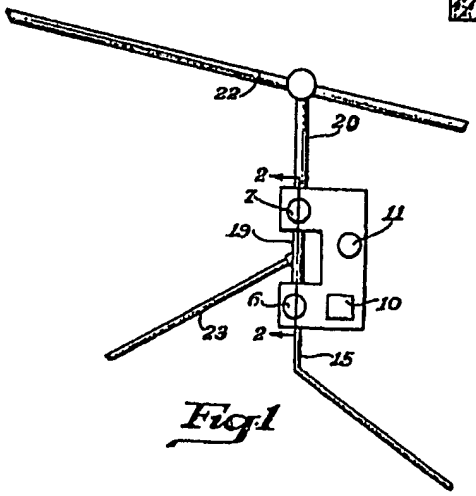

Fig. 1

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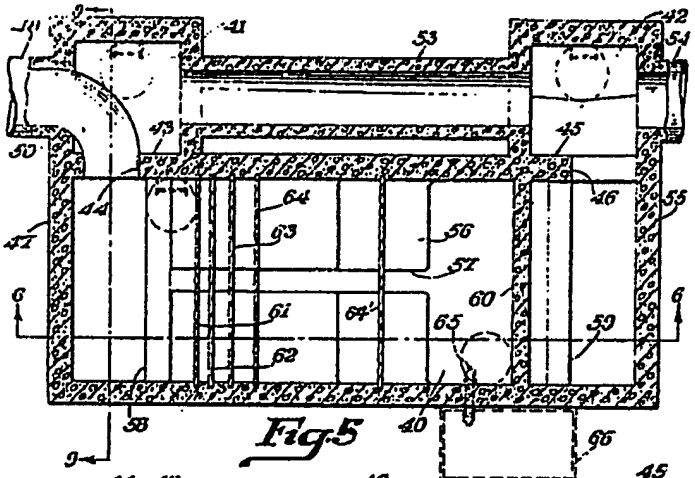

Fig.5

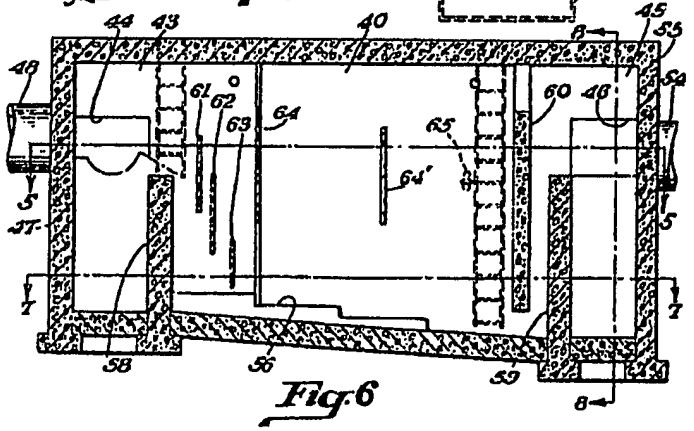

Fig.6

H.M.S.O.(Ty. P.)

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SHEET 1

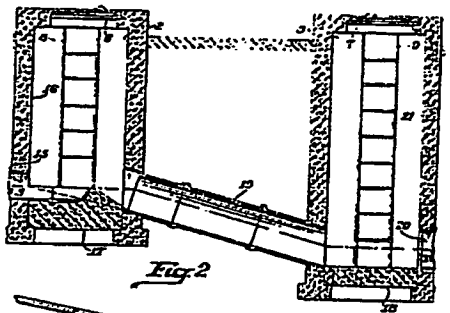


Fig-2

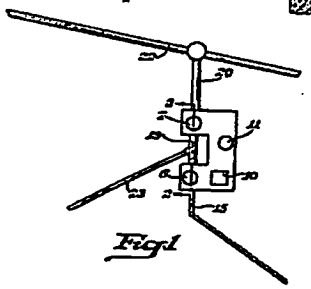


Fig-1

SHEET 3

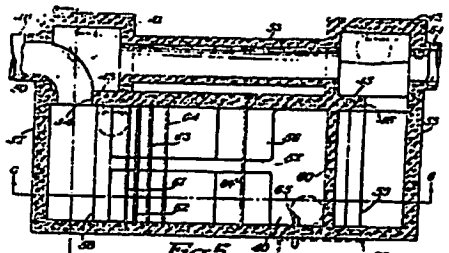


Fig-5

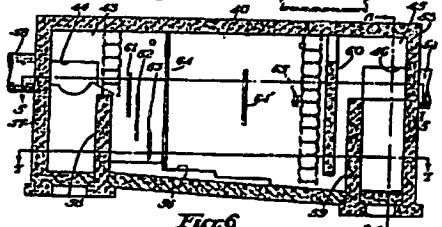


Fig-6

[This Drawing is a reproduction of the Original on a reduced scale]

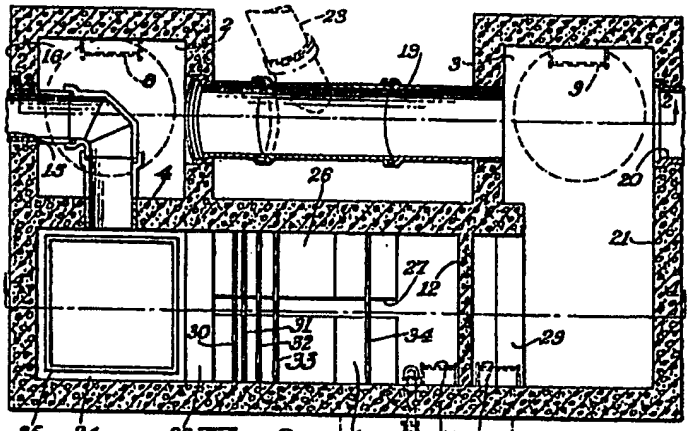


Fig. 3

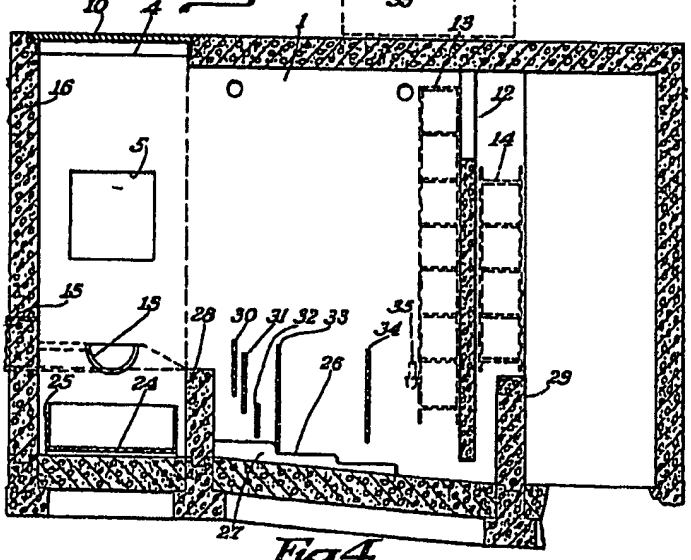
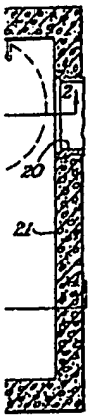


Fig. 4



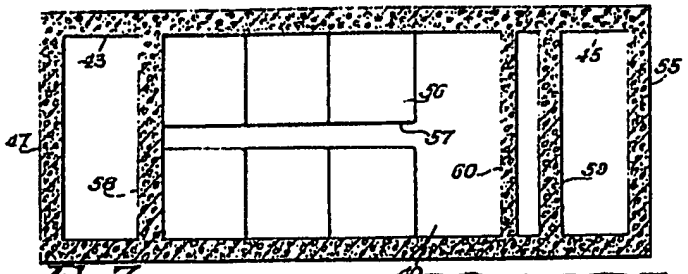


Fig. 7

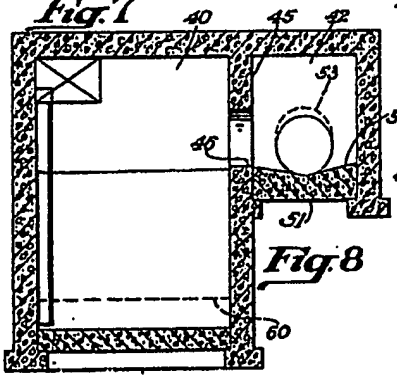


Fig. 8

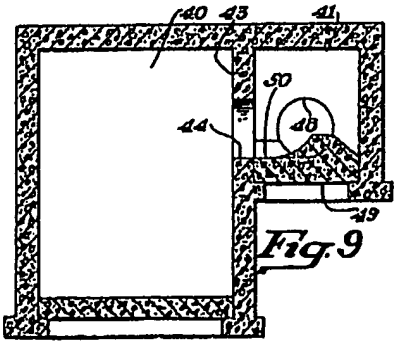
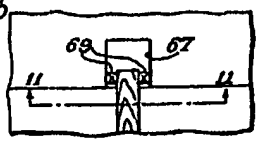


Fig. 9



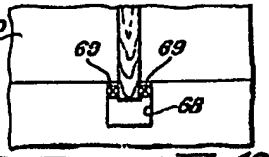


Fig. 10

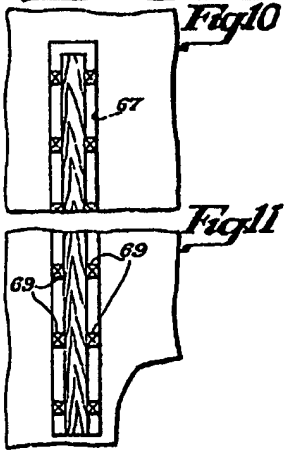


Fig. 11

604,083 COMPLETE SPECIFICATION

6 SHEETS

SHEET 3

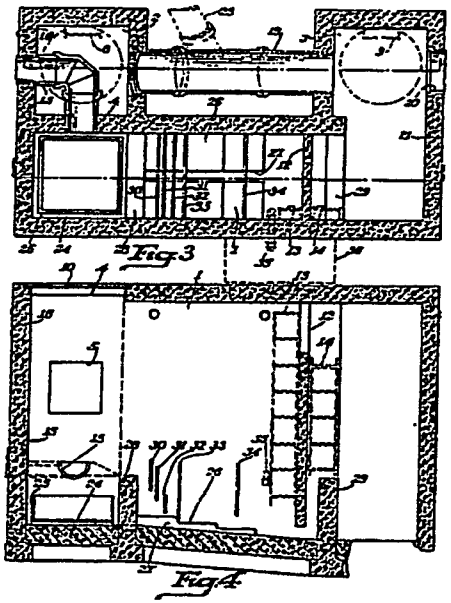


Fig.3

Fig.4

SHEET 4

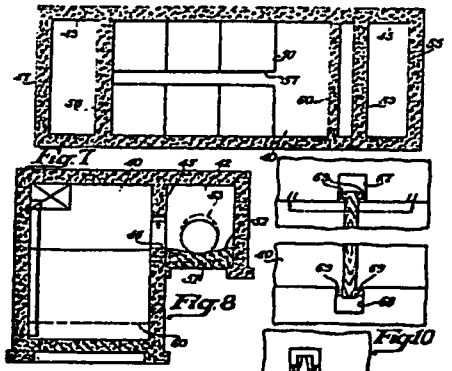


Fig.1

Fig.8

Fig.10

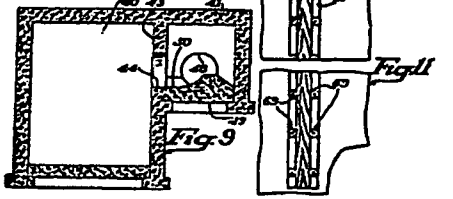


Fig.9

Fig.11

[This Drawing is a reproduction of the Original on a reduced scale]

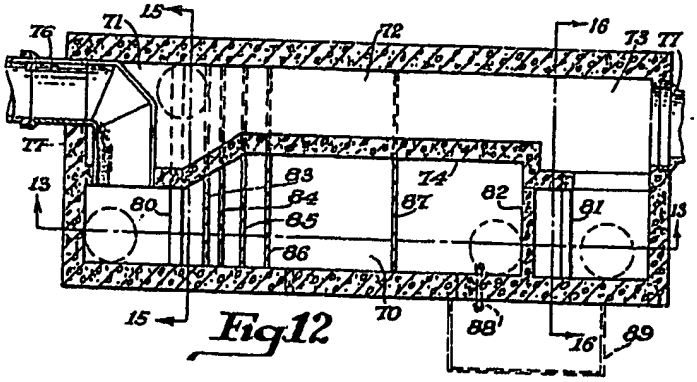


Fig12

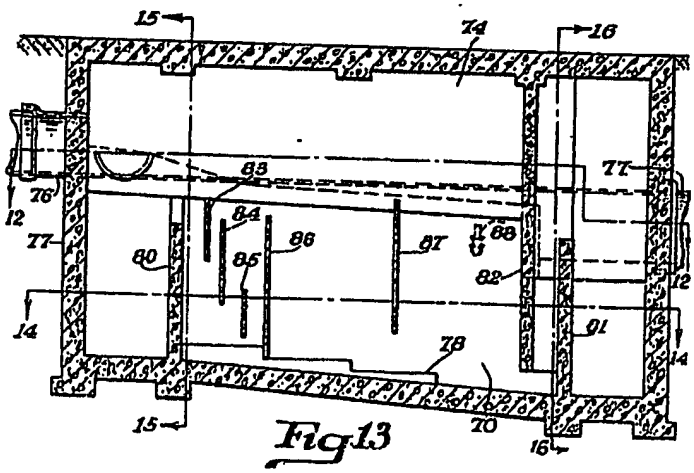


Fig13

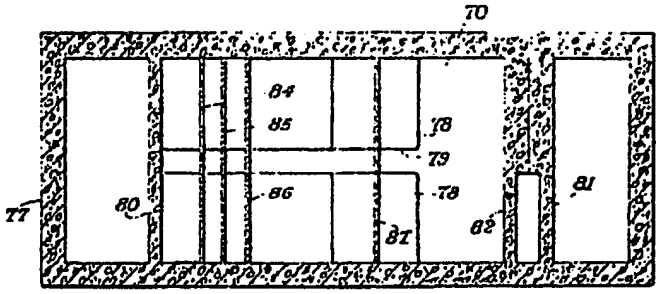
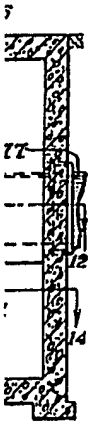


Fig.14



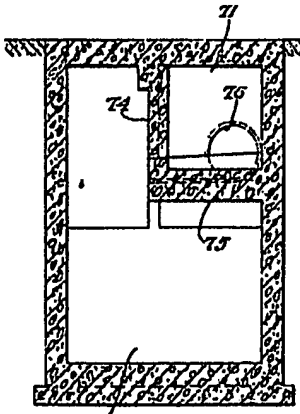


Fig.15

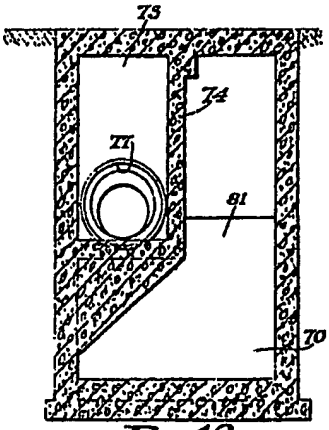


Fig.16

604,083 COMPLETE SPECIFICATION

SHEET 5

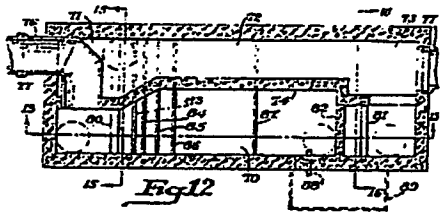


Fig.12

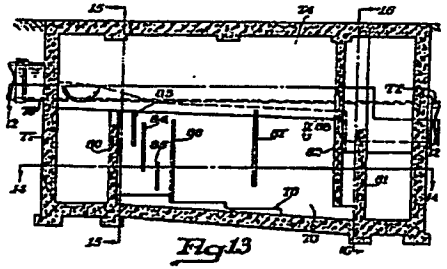


Fig.13

SHEET 6

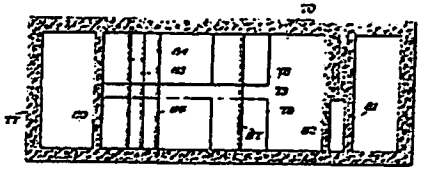


Fig.14

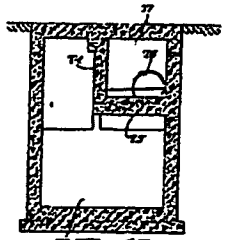


Fig.15

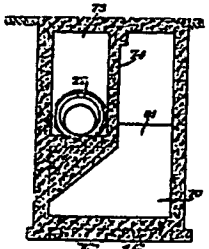


Fig.16

(This Drawing is a reproduction of the Original on a reduced scale.)

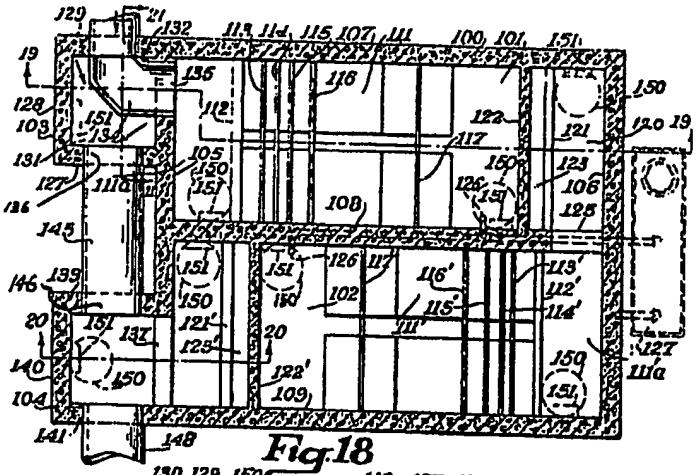


Fig.18

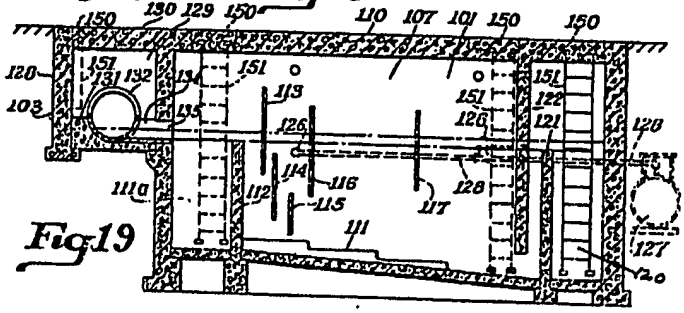


Fig.19

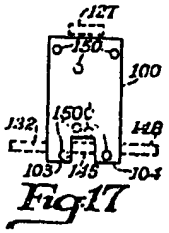


Fig.17

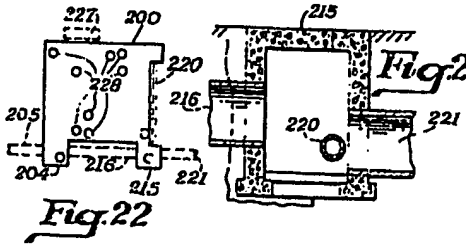


Fig.22

Fig.24

Fig.24

321

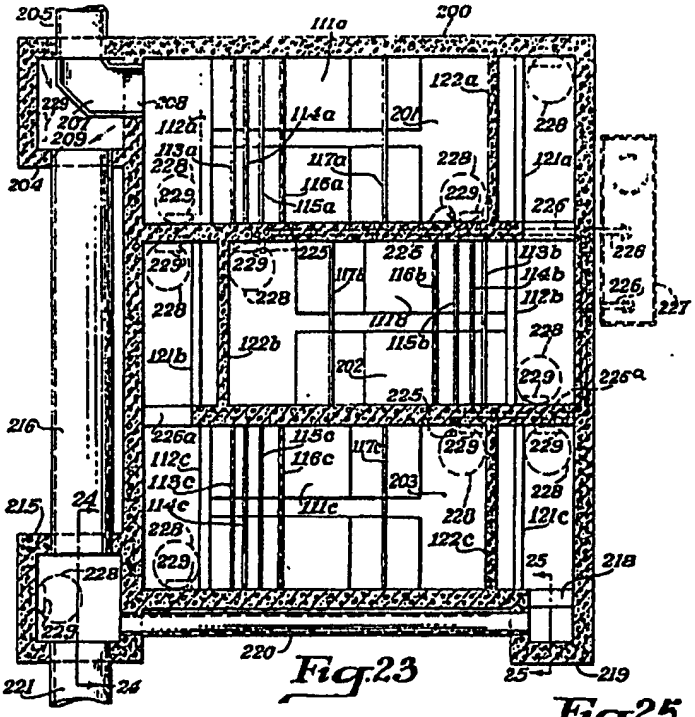


Fig.23

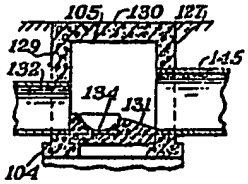


Fig.21

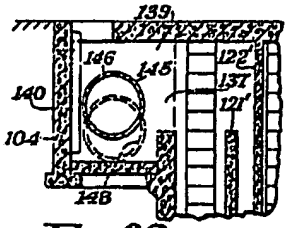


Fig.20

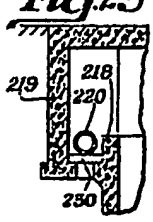


Fig.25

504,083 COMPLETE SPECIFICATION

SHEET 7

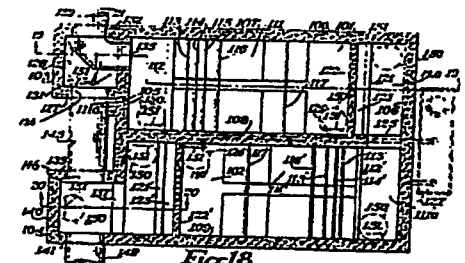


Fig.18

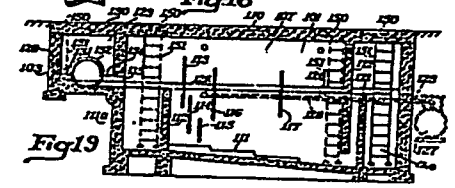


Fig.19

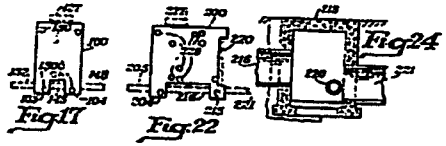


Fig.17

Fig.22

Fig.24

SHEET 8

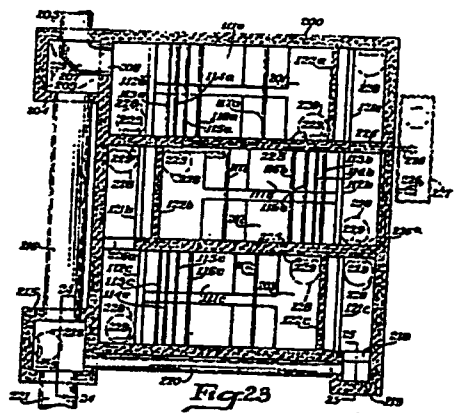


Fig.23

Fig.25

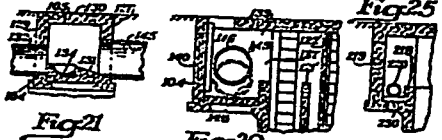


Fig.21

Fig.20

[This Drawing is a reproduction of the Original on a reduced scale.]